Naval Helicopter Association 2006

Col. James Jamison

Naval Safety

“Change is the mother of all risk”

RADM Skip Dirren

“What’s different today?

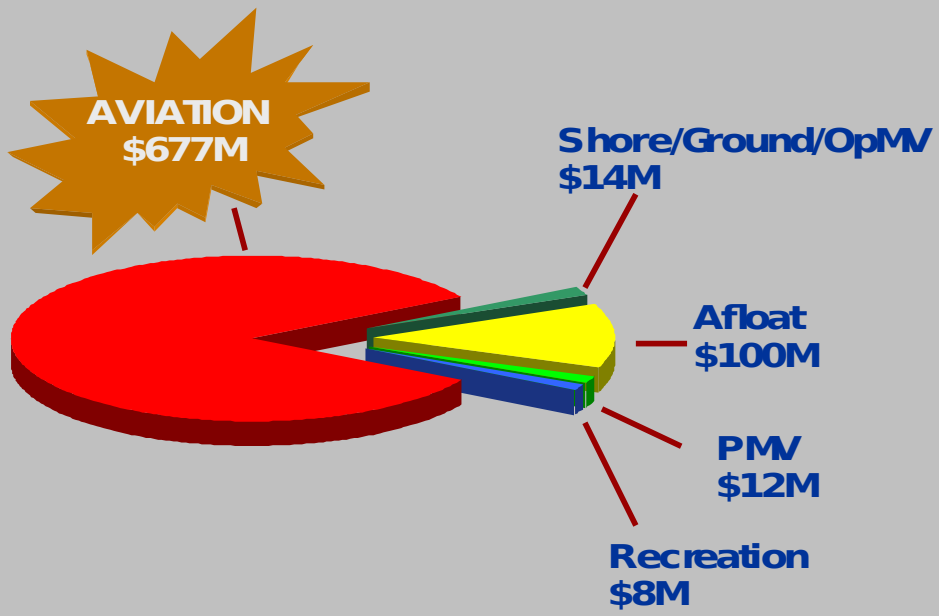
CAPT “Nubs” Neubauer

How are Your Sailors Performing Assigned Tasks?

FY05 Total Cost and Deaths

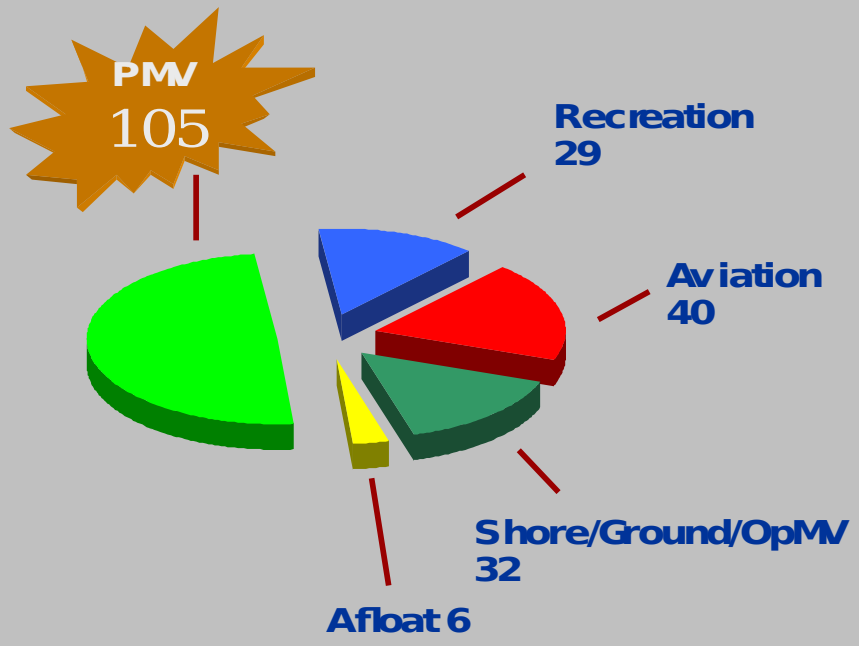
Navy and Marine Corps

Cost



Total Cost: $811M

Fatalities

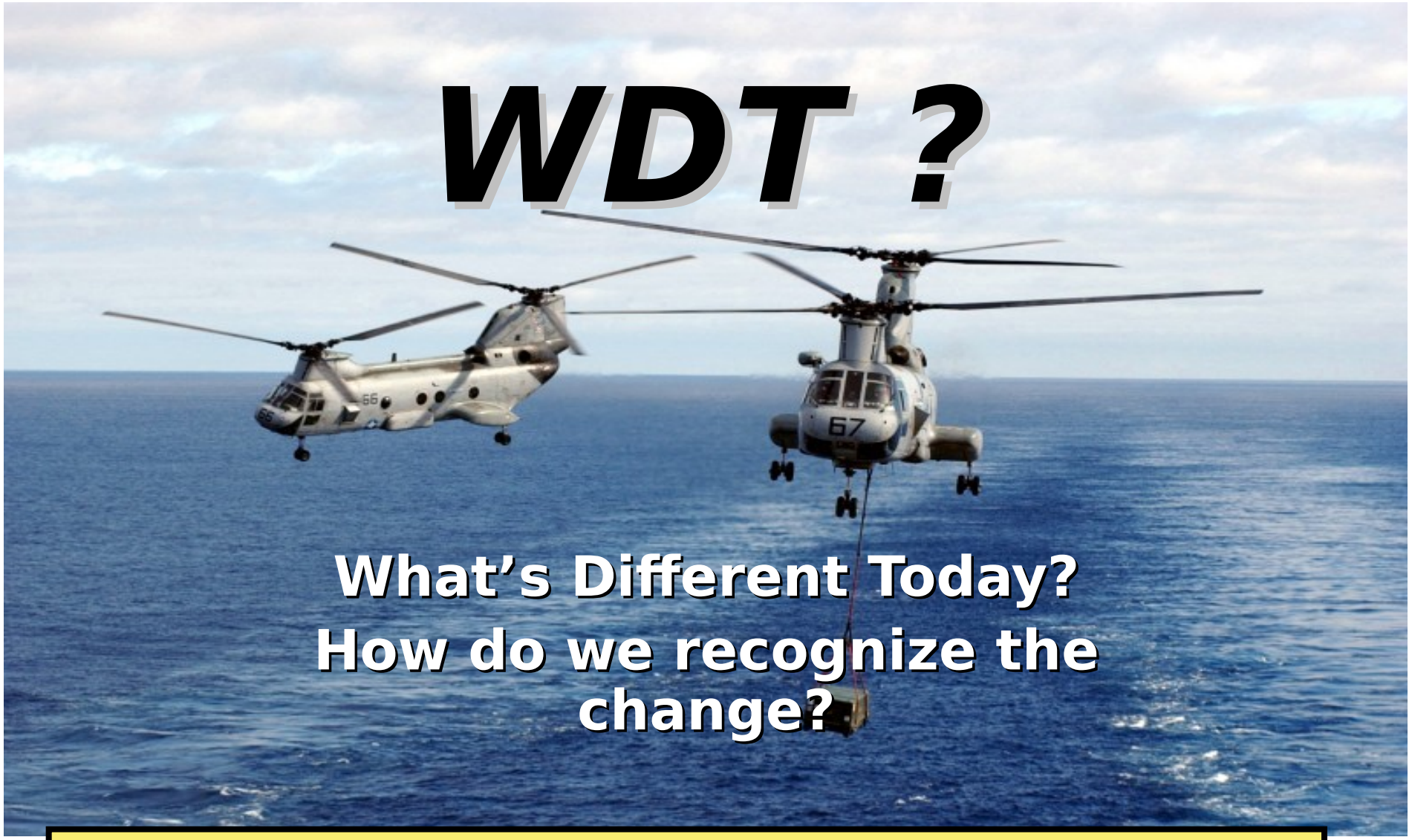


Total Fatalities: 212

Speeding – The Difference 5 km/h Makes!

Blue Threat – Action/Inaction by own forces causing losses

Blue Threat – Losses far exceed Red Threat losses



WDT ?

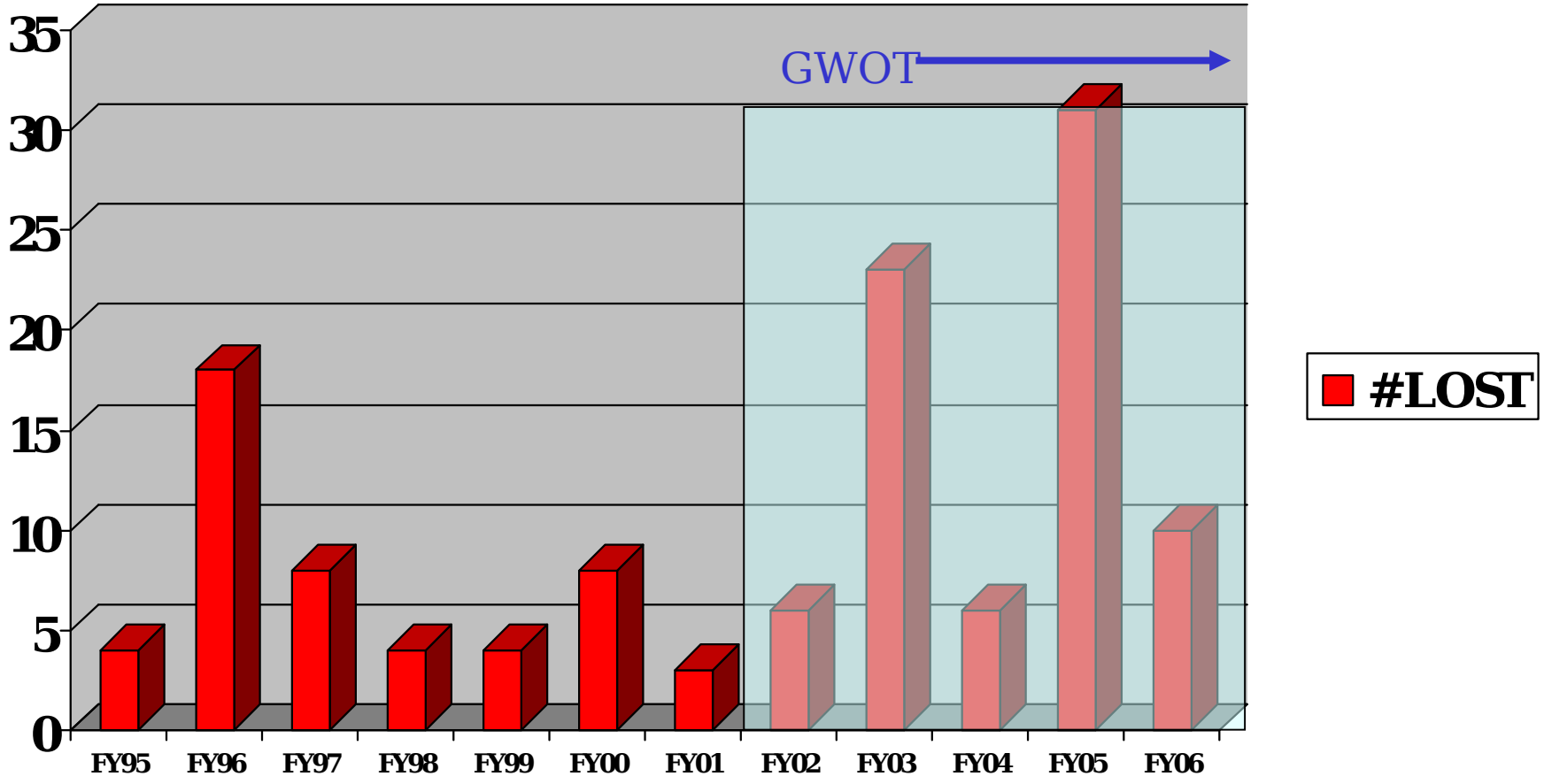
What's Different Today?

How do we recognize the change?

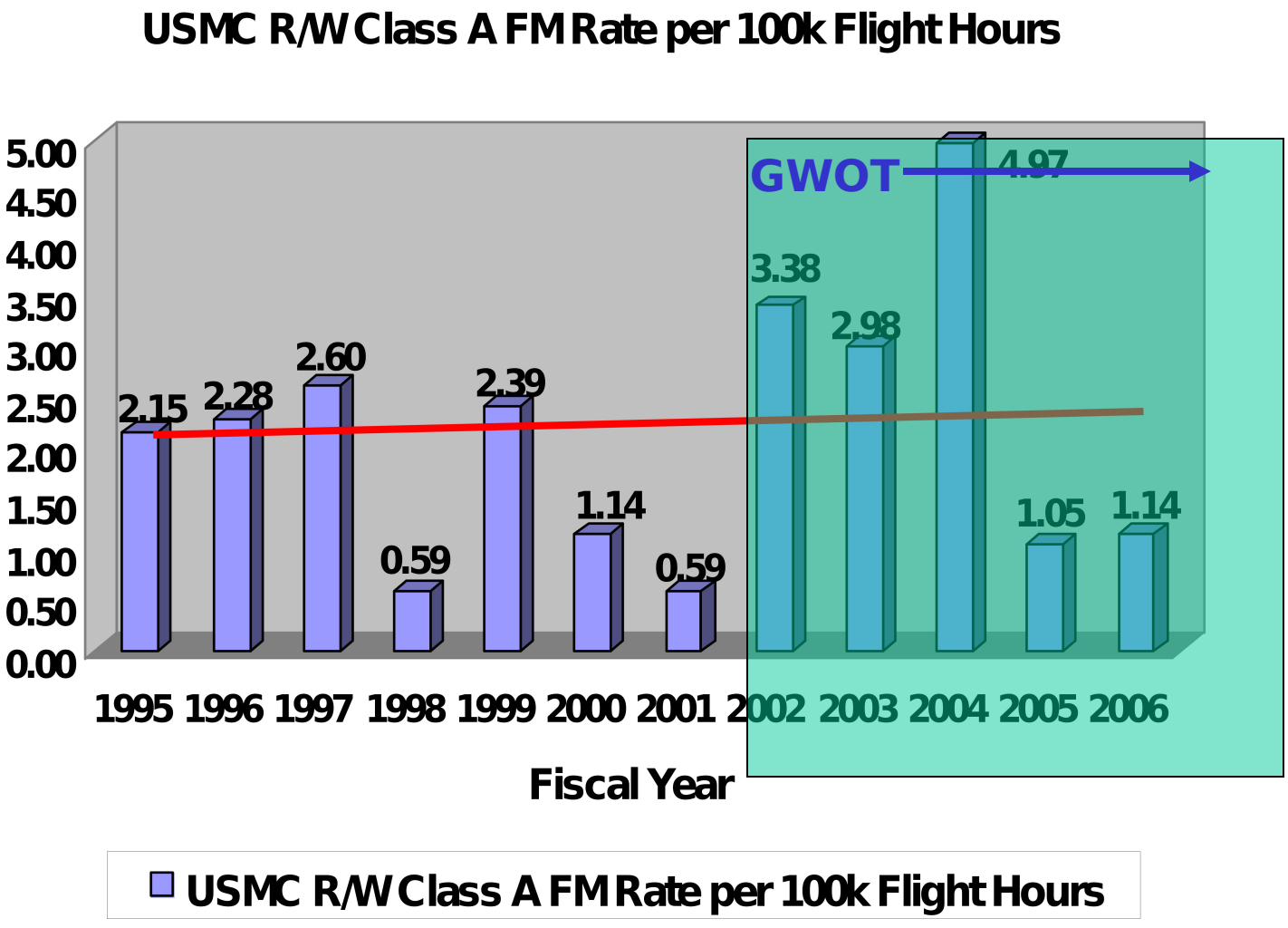
- Technique to connect all three levels of ORM
- Energizes a final execution of deliberate ORM process
- Spurs the use of Time Critical ORM during execution
- The missing piece in ORM understanding and proper application

USMC Rotary Wing Trend Loss

of USMC Rotary Wing Lives Lost



USMC Rotary Wing Mishap Trend



Causal Factors in USMC Helicopter Mishaps

Marine Helicopter Class A Flight Mishaps (Rate per 100k Hrs)

Involved Factor	#Mishaps	Rate	Percent
Aircrew Factor	28	1.48	**68%**
Material Malfunction	11	0.58	27%
Maintenance Personnel	2	0.11	5%
Supervisory Personnel	26	1.38	**63%**
Facilities Personnel	6	0.32	15%
Human Error	34	1.80	**83%**
Under Investigation	4	0.21	10%
Undetermined	2	0.11	5%
All Helo Mishaps (FY95-FY05)	41	2.17	100%

A mishap can have more than one Causal Factor. Human Error includes Aircrew, Maintenance Errors, & Supervisory Factors (which can be counted more than once in a mishap)

USMC Rotary Wing Location Comparison

	USMC CLASS A FM'S DURING GWOT (NOT INCLUDING DIRECT ENEMY ACTION)										
	Non-Hostile Mishaps										
	In-Theater (Iraq, Afghanistan, Pakistan, JTFHOA)					Vs	CONUS and OCONUS (Okinawa, Australia, Blue Water Ops)				
	Date	Location	Aircraft	Fatalities	Destroyed		Date	Location	Aircraft	Fatalities	Destroyed
FY02	6-Dec-01	Afghanistan	UH-1N	0	1		14-Feb-02	CONUS	UH-1N	2	1
	20-Jan-02	Afghanistan	CH-53E	2	1		9-Mar-02	CONUS	HH-46D	1	1
	11-Feb-02	JTFHOA	UH-1N	0	1		27-Jun-02	CONUS	AH-1W	0	1
	In-Theater (Iraq, Afghanistan, Pakistan, JTFHOA)					Vs	CONUS and OCONUS (Okinawa, Australia, Blue Water Ops)				
	Date	Location	Aircraft	Fatalities	Destroyed		Date	Location	Aircraft	Fatalities	Destroyed
FY03	21-Mar-03	Iraq	CH-46E	12	1		22-Jan-03	CONUS	2 AH-1W	4	2
	26-Mar-03	Iraq	UH-1N	0	1						
	30-Mar-03	Iraq	UH-1N	3	1						
	19-May-03	Iraq	CH-46E	4	1						
	22-Jun-03	*JTFHOA	2 CH-53E	10	2						
	In-Theater (Iraq, Afghanistan, Pakistan, JTFHOA)					Vs	CONUS and OCONUS (Okinawa, Australia, Blue Water Ops)				
	Date	Location	Aircraft	Fatalities	Destroyed		Date	Location	Aircraft	Fatalities	Destroyed
FY04	30-Mar-04	Iraq	2 AH-1W	0	2		22-Oct-03	CONUS	UH-1N	0	1
	26-Apr-04	Afghanistan	CH-46E	0	1		22-Jan-04	CONUS	UH-1N	4	1
	11-Aug-04	Iraq	CH-53E	2	1		23-Jan-04	CONUS	AH-1W	0	1
	13-Sep-04	Iraq	CH-53E	0			13-Aug-04	OCONUS	CH-53D	0	1
	In-Theater (Iraq, Afghanistan, Pakistan, JTFHOA)					Vs	CONUS and OCONUS (Okinawa, Australia, Blue Water Ops)				
	Date	Location	Aircraft	Fatalities	Destroyed		Date	Location	Aircraft	Fatalities	Destroyed
FY05	26-Jan-05	Iraq	CH-53E	31	1						
	5-Apr-05	Iraq	CH-46E	0							
	In-Theater (Iraq, Afghanistan, Pakistan, JTFHOA)					Vs	CONUS and OCONUS (Okinawa, Australia, Blue Water Ops)				
	Date	Location	Aircraft	Fatalities	Destroyed		Date	Location	Aircraft	Fatalities	Destroyed
FY06	17-Feb-06	JTFHOA	2 CH-53E	10	2						

USMC Rotary Wing Mishaps In-Theater
(Non-Hostile)

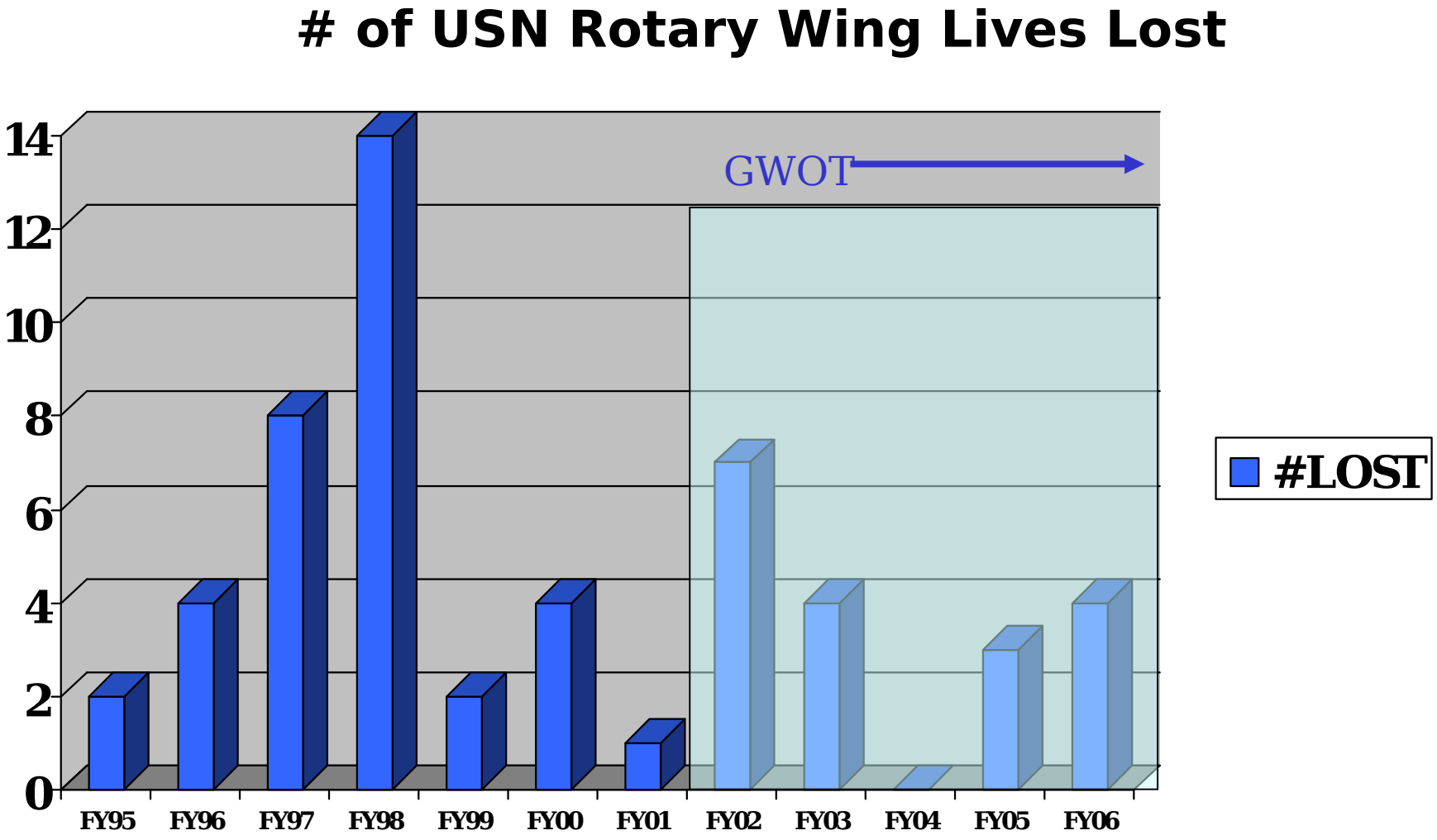
NON-HOSTILE ISO GWOT (CLASS A FM'S)					
DATE	**T/M/S**	**LOCATION**	**CAUSE FACTORS**	**LOSS**	**SUMMARY**
6-Dec-01	**UH-1N**	**Afghanistan**	(1) Aircrew (2) Supervisory	X	Encountered brownout conditions on takeoff, struck ground, rolled and burned
20-Jan-02	**CH-53E**	**Afghanistan**	(1) Aircrew (2) Material (3) Supervisory	X	Hard landing after engine failure
11-Feb-02	**UH-1N**	**JTFHOA**	(1) Aircrew (2) Supervisory	X	Hard landing
21-Mar-03	**CH-46E**	**Iraq**	(1) Aircrew (2) Supervisory	X	Controlled flight into terrain (CFIT) during night combat mission
26-Mar-03	**UH-1N**	**Iraq**	(1) Aircrew (2) Material (3) Supervisory	X	Hard landing
30-Mar-03	**UH-1N**	**Iraq**	Aircrew	X	Impacted ground on takeoff at Forward Arming Refueling Point (FAR Brownout conditions at night
19-May-03	**CH-46E**	**Iraq**	Aircrew	X	Wire strike
22-Jun-03	**2 CH-53E**	**JTFHOA**	Aircrew (Friendly fire)	XX	USAF B-52 training off-target ordnance delivery incident
30-Mar-04	**2 AH-1W**	**Iraq**	Aircrew	XX	Collided on taxiway at night
26-Apr-04	**CH-46E**	**Afghanistan**	(1) Aircrew (2) Supervisory	X	Hard landing
11-Aug-04	**CH-53E**	**Iraq**	(1) Facility (2) Aircrew	X	Crashed into ground on night mission. Improper loading affecting
13-Sep-04	**CH-53E**	**Iraq**	(1) Aircrew (2) Supervisory		Tail struck ground during night landing
26-Jan-05	**CH-53E**	**Iraq**	(1) Aircrew	X	Crashed into ground in reduced visibility condintions
05-Apr-05	**CH-46E**	**Iraq**	(1) Aircrew (2)Facility		Struck cable of tethered Aero-Stat Balloon
17-Feb-06	**2 CH-53E**	**HOA**	(8) Aircrew (8) Supervisory	XX	Overwater Midair Collision during a scheduled training mission in Horn of Africa (HOA)
				16 Total	

USMC In-Theater Hostile Helicopter Losses in Support of GWOT

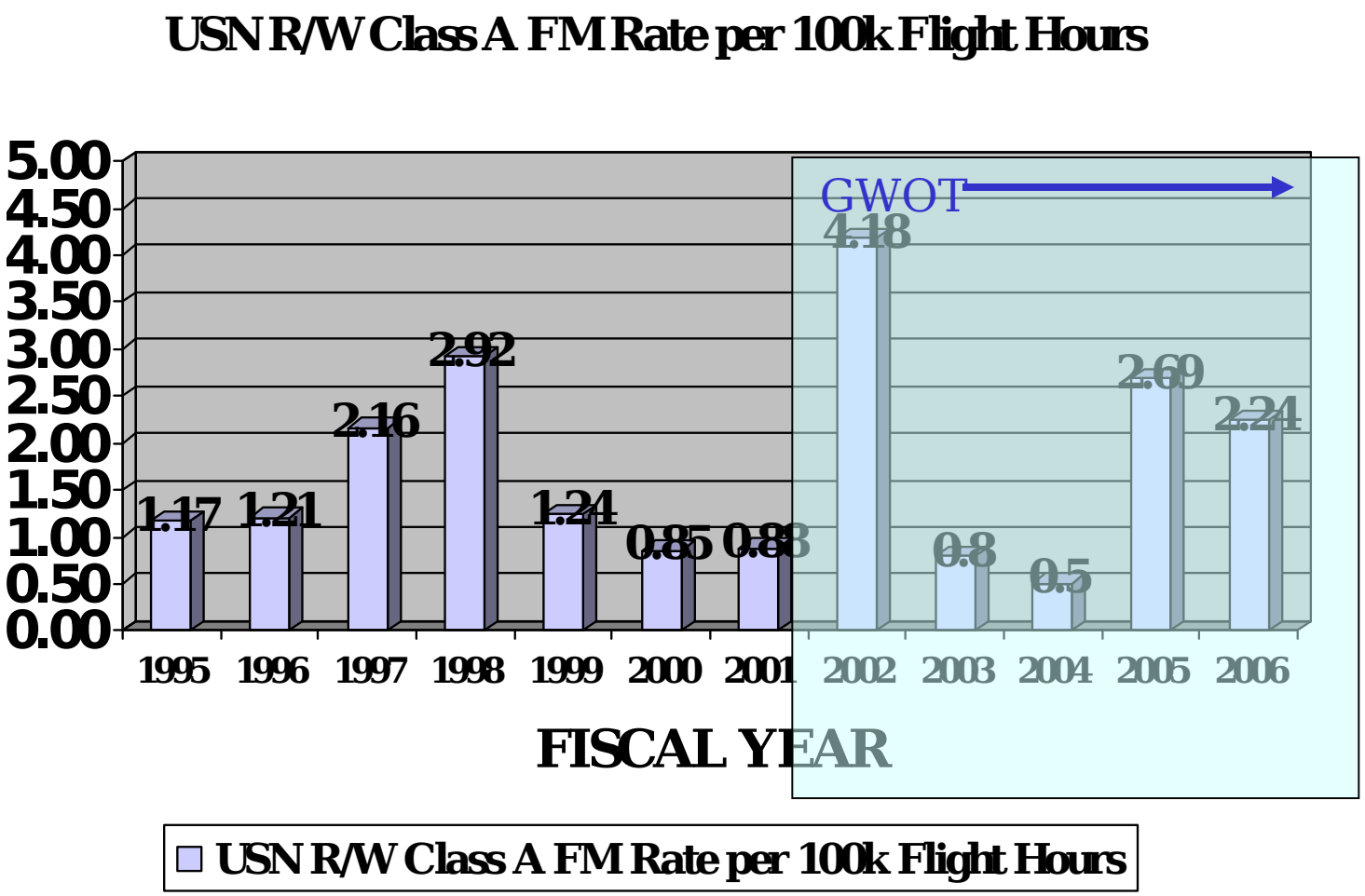
GWOT HOSTILE LOSSES 7 Total Hostile Losses (4 SAFIRE)			
DATE	**T/M/S**	**LOCATION**	**CAUSE**
04-Apr-03	**AH-1W**	**Iraq**	Aircraft collided with unlit tower during combat
14-Apr-03	**AH-1W**	**Iraq**	Aircraft was struck by fragments from secondary target explosions
30-Apr-03	**CH-53E**	**Iraq**	Aircraft engine and fuselage fire during combat (aircraft blown in place by J DAM)
24-May-04	**AH-1W**	**Iraq**	Aircraft was hit by RPG while providing close air support (SAFIRE)
05-Aug-04	**UH-1N**	**Iraq**	Aircraft hit by RPG and small arms fire (SAFIRE)
09-Sep-04	**CH-46E**	**Iraq**	Aircraft hit by RPG and small arms fire (SAFIRE)
02-Nov-05	**AH-1W**	**Iraq**	Aircraft conducting convoy escort mission. Cause under investigation. (SAFIRE)

USN Rotary Wing Loss Trend

(non-combat)



USN Rotary Wing Mishap Trend



Causal Factors in Navy Helicopter Mishaps

Involved Factor	#Mishaps	Rate	Percent
Aircrew Factor	31	1.17	**69%**
Material Malfunction	15	0.57	33%
Maintenance Personnel	10	0.38	22%
Supervisory Personnel	29	1.10	**64%**
Facilities Personnel	2	0.08	4%
Human Error	37	1.40	**82%**
Under Investigation	4	0.15	9%
Undetermined	1	0.04	2%
All Helo Mishaps (FY95-FY05)	45	1.70	100%

A mishap can have more than one Causal Factor. Human Error includes Aircrew, Maintenance Errors, & Supervisory Factors (which can be counted more than once in a mishap)

USN Class A FMs During GWOT
(not including direct enemy action)

USN CLASS A FM'S DURING GWOT (NOT INCLUDING DIRECT ENEMY ACTION)											
Non-Hostile Mishaps											
	In-Theater					Vs	CONUS and OCONUS				
	Date	Location	Aircraft	Fatalities	Destroyed		Date	Location	Aircraft	Fatalities	Destroyed
FY02							7-Feb-02	CONUS	CH-46D	0	1
							12-Mar-02	OCONUS	SH-60B	3	1
							28-Mar-02	CONUS	HH-1N	2	1
							2-Apr-02	OCONUS	MH-53E	0	1
							4-May-02	CONUS	SH-60B	0	1
							13-Jun-02	CONUS	HH-1N	1	
							27-Jun-02	OCONUS	MH-53E	0	
							5-Jul-02	OCONUS	UH-3H	0	1
							16-Aug-02	CONUS	TH-57C	0	1
							6-Sep-02	OCONUS	SH-60B	1	1
	In-Theater					Vs	CONUS and OCONUS				
	Date	Location	Aircraft	Fatalities	Destroyed		Date	Location	Aircraft	Fatalities	Destroyed
FY03	8-Apr-03	Iraq	HH-60H	0			16-Jul-03	OCONUS	MH-53E	4	1
	In-Theater					Vs	CONUS and OCONUS				
	Date	Location	Aircraft	Fatalities	Destroyed		Date	Location	Aircraft	Fatalities	Destroyed
FY04							4-Mar-04	CONUS	SH-60B	0	
	In-Theater					Vs	CONUS and OCONUS				
	Date	Location	Aircraft	Fatalities	Destroyed		Date	Location	Aircraft	Fatalities	Destroyed
FY05	7-Oct-04	Kuwait	HH-60H	0			10-Jan-05	OCONUS	SH-60F	0	
							25-Jan-05	CONUS	MH-53E	0	1
							16-Feb-05	OCONUS	MH-53E	0	1
							24-Sep-05	CONUS	SH-60B	3	1
	In-Theater					Vs	CONUS and OCONUS				
	Date	Location	Aircraft	Fatalities	Destroyed		Date	Location	Aircraft	Fatalities	Destroyed
FY06							13-Dec-05	OCONUS	SH-60B	3	1

USN Rotary Wing Mishaps In-Theater
(Non-Hostile)

NON-HOSTILE ISO GWOT (CLASS A FM'S)					
DATE	**T/M/S**	**LOCATION**	**CAUSE FACTORS**	**LOSS**	**SUMMARY**
08-Apr-03	**HH-60H**	**Iraq**	(1) Aircrew (2) Supervisory		During ops mission aircraft struck ground and parked aircraft and rolled
07-Oct -04	**HH-60H**	**Kuwait**	(1) Aircrew (2) Material (3) Supervisory		Aircraft spun and struck ground after loss of tail rotor post takeoff

USN In-Theater Hostile Helicopter Losses in Support of GWOT

- None to date

What is Changing??

- New missions?
- What's Different Tomorrow?


4301

H-60 Takeoff Mishap Recap

- About 1 week prior to mishap det deployed on USS Smallboy
- Multiple NVD training events during transit cnx due to wx, PIM winds, and aircraft issues.
- Original mishap day flight sked included NVD currency for MP
- Location of a COI caused flight sked to shift right and become all OPS no Training
- Flight sked times were to shift 4 hours, but actual shift became 6.5 hours
- Although directed to rest, MP achieved no meaningful sleep for about 20 hours prior to the mishap

H-60 Takeoff Mishap Recap cont'd

- ORM analysis completed by MC did not adequately address the hazards of wx, crew proficiency, crew rest
- The takeoff time was about 40 minutes before sunrise and takeoff was unaided
- Wx was 200-600 BKN, 800 OVC, VIS 10 miles with a horizon visible to dark adapted shipboard lookouts, except during periods of rain showers.
- Light rain was falling at the time of takeoff
- Flight deck lighting was at full bright setting prior to launch
- Nose attitude started down in conjunction with the power pull, and the takeoff profile never achieved a significant climb
- Shipboard lookouts observed the aircraft in a nose down attitude prior to water impact about 30 seconds after takeoff

Blue Threat Analysis

- Events conspired to prevent NVD qualification
- Flight schedule shifted to the right
- Failure to obtain rest
- Ineffective ORM assessment
- Internally generated pressure/motivation to perform mission
- Improper takeoff procedure and profile
- Crew coordination failure – inadequate doctrine
- Wait for sunrise?

H-60 NVG Mishap Recap

- Mission was two flights including night unaided/aided RLQ period aboard USS Smallboy
- Crew brief omitted required NVG specific items.
- MHAC ORM self assessed risk level required OIC approval and notification of ship CO - neither was accomplished
- Weather for the entire day was hazy with the horizon difficult to discern even during day flight events
- At the time of the mishap, weather was 3000 BKN with 6 miles VIS in haze, horizon obscured by haze

H-60 NVG Mishap Recap con

- MAC exhibited AFCS issues several times during day time flights on the day of the mishap
- The MCP hot seated into the MAC, launched about 2100 and completed unaided approaches and deck landings
- While the ship maneuvered the MAC donned NVGs, then completed an approach and two landings
- The second and third approaches resulted in wave-offs and the MC reported problems with the pilot Attitude indicator and the AFCS system

H-60 NVG Mishap Recap con

- The ship commenced a 20 minute repositioning while the MC continued trouble shooting, eventually reporting problems with both AIs and both BDHIs and no visible horizon
- The MC announced their intent to recover onboard own ship, then asked for pigeons to a shore based field, then pigeons to a nearby L class ship
- The MC announced intent to mark on top of own ship and proceed to the L class ship at 1500 feet
- Subsequent attempts to contact the aircraft elicited several abrupt ‘standby’ calls from the MC, and then no further responses

Blue Threat Analysis

- Incomplete ORM assessment
- Conduct of NVG ops in IMC
- Material failure
- Choice of transit flight regime
- Lack of training emphasis on partial panel skills
- Crew coordination-task saturation, distraction

MH-53E Mishap Recap

- SWO contacted squadron prior to brief to place additional ASR to move parts and passenger to additional FOB
- Briefed from non-standard guide and fly at 300 feet AGL all night
- NVG considerations brief only included SLAP info (not loss of visual contact, weather contingencies, or diverts)
- Mishap section lead briefed section – “everything will be “SOP.”

MH-53E Mishap Recap cont

- Section realized they had enough seats to do original mission, but less than required for additional ASR – section lead contacted squadron duty officer to confirm additional ASR still a requirement.
- While waiting to load passengers, neither duty officer nor aircrew in section called to update weather.
- Aircraft landed at FOB2, no parts there.
- Section decided at FOB2, no need to refuel.

MH-53E Mishap Recap cont

- No update of weather brief at FOB2 (reported weather at destination – from 0000 to 0900 .5 SM visibility due to mist).
- Decreasing visibility to 1 SM from 45 miles out of destination.
- Flight maintained 300 feet AGL and 130 knots.
- At 25 miles, visibility rapidly deteriorating to .6 SM.
- Section lead did not have fuel to divert.
- 2.5 minutes prior to crash mishap aircraft asked lead to turn on tail light, observer asked lead to slow down because mishap aircraft was falling behind.

MH-53E Mishap Recap cont

- 30 seconds prior to crash – lead can only see ground at an angle of 30 to 40 degrees in front of them and no visible horizon.
- Between 8 and 5 seconds prior to crash – GPWS gives aural alert / aircraft is at 40 degrees AOB, 19 degrees nose down, 153 knots, 3237 feet per minute rate of descent, at 407 feet AGL.
- Section lead was unable to assume on-scene commander because of low fuel state and prevailing weather.
- Air boss tried to launch airborne quick reaction force, but weather prevented a safe launch

Blue Threat Analysis

- Standard and thorough briefs are essential.
- Changing missions, with no confirmation, which results in needlessly extending flights puts aircrew at significant risk.
- Updating weather throughout flight is critical.
- You can never have too much gas, especially in an H-53.
- When weather rapidly deteriorates, it is time to reevaluate flight plans.

MH-53E Mishap Recap

- Scheduled to fly three hour Familiarization / Instrument flight.
- Last flight for mishap crew chief.
- Aircraft commander identified as high risk aviator.
- Mishap aircraft commander did not use command ORM briefing guide that discussed maneuvers to be flown.
- Brief did not include steps for performing maneuver.

MH-53E Mishap Recap cont

- Hot pit cancelled and had 15 minutes extra to fly flight.
- Mishap co-pilot requested aircraft commander demonstrate “scoop out” maneuver.
- No written procedure for maneuver (simulated dual engine fly away from a HOGE).
- Aircraft commander had been taught maneuver by by Squadron NATOPS officer / Instructor.

MH-53E Mishap Recap cont

- No guidance given to crew prior to maneuver initiation.
- Aggressive entry caused aircraft to develop an excessive rate of descent.
- Maneuver introduced to squadron by Sikorsky by manufacturer pilot for FCF pilots.
- Manufacturer pilot taught maneuver only to squadron NATOPS Instructor.

MH-53E Mishap Recap cont

- NATOPS Instructor taught other pilots with no written procedures or documented permission from higher authority.
- Standardization board discussed maneuver – differing opinions on whether permission was granted to fly maneuver.
- Standardization board never briefed CO regarding maneuver and was not aware maneuver was being flown.

Blue Threat Analysis

- Thorough briefs are needed for successful accomplishment of the mission.
- Published procedures and permission to fly maneuvers are essential.
- High risk aviators need to be actively managed and monitored.
- If only one crew member knows the parameters of a maneuver, there is no ability to assist.
- Squadron leadership needs to periodically take an introspective look at all operations to mitigate undetected hazards.

MH-53E Mishap Recap

- Mission was day time mine-sweep training in off-shore Op area approximately 30 miles from land
- MC established hover and were preparing to launch sweep gear
- Crewman reported hearing unfamiliar sound like a jigsaw
- MCP noticed unusually high torque indication
- Aircrewmen recommended aborting the mission, HAC agreed and transit commenced
- Pilots became aware of sound and vibration

MH-53E Mishap Recap cont

- HAC ordered precautionary ditching preparations
- After two minutes forward flight, noise became louder and vibration more intense
- Two more minutes elapse before a main gearbox chip light illuminated
- The PAC, the co-pilot, announced ditch, ditch, ditch and flared to commence landing. No one among the MAC or HAC voiced objections.
- After experiencing additional secondary indications of failure during ditching maneuver, the aircraft was successfully landed in the water and all MAC egressed
- Despite numerous difficulties with egress, survival gear, and boarding of the raft, all MAC were rescued successfully.

Overcoming the Blue Threat

- Detection of the problem
- Effective communication
- Selection of a course of action
- Effective NATOPS EP guidance
- Training set pre-conditions for success
- Decisive action
- Water survival training overcame egress difficulties
- Crew coordination success
- Best case outcome

Aviation Trends and Takeaways

TRENDS

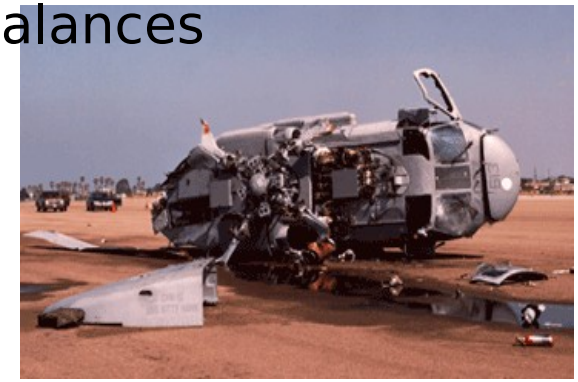
Mishap Investigations

- Human error (aircrew):
  Leading causal factors
  - Skill-based errors
  - Decision errors

  Leading preconditions for errors
  - CRM failures
  - Adverse mental states
- Inexperience
- Training issues

TAKEAWAYS

- State-of-art simulators and data centric systems
- Training
- Proficiency
- Institutionalize ORM & CRM
- Enforce standards
- Increase checks and balances



Aviation Best Practices

- Risk Assessment of Blue vs Red Threat
- Best Practices collection available at http://www.safetycenter.navy.mil/bestpractices/default.htm
- Human Factors Council (HFC) process that includes maintenance personnel – VAW-126
- Complacency Avoidance Plan – attacks the OIF Blue Threat – HMLA-369
- Desert Landing Policy and Mitigation Strategy – MAG16
- Drive Safe Indoctrination Presentation – HSC-2
- Safety Billet Continuity – people in billets for 1 year minimum and good turnover binders (see website for VFA-14 binder example)
- Post Flight incident report form in Maintenance Control or with SDO – captures info for R&I board and potential HAZREP
- Got a Best Practice? Send it to the Webmaster at the Safety Center. We'll add it to the collection and credit your squadron!!

Survey Takeaways - FY 2005

Safety Surveys on 90+ aviation commands revealed:

Ø Aviation HAZREP submissions

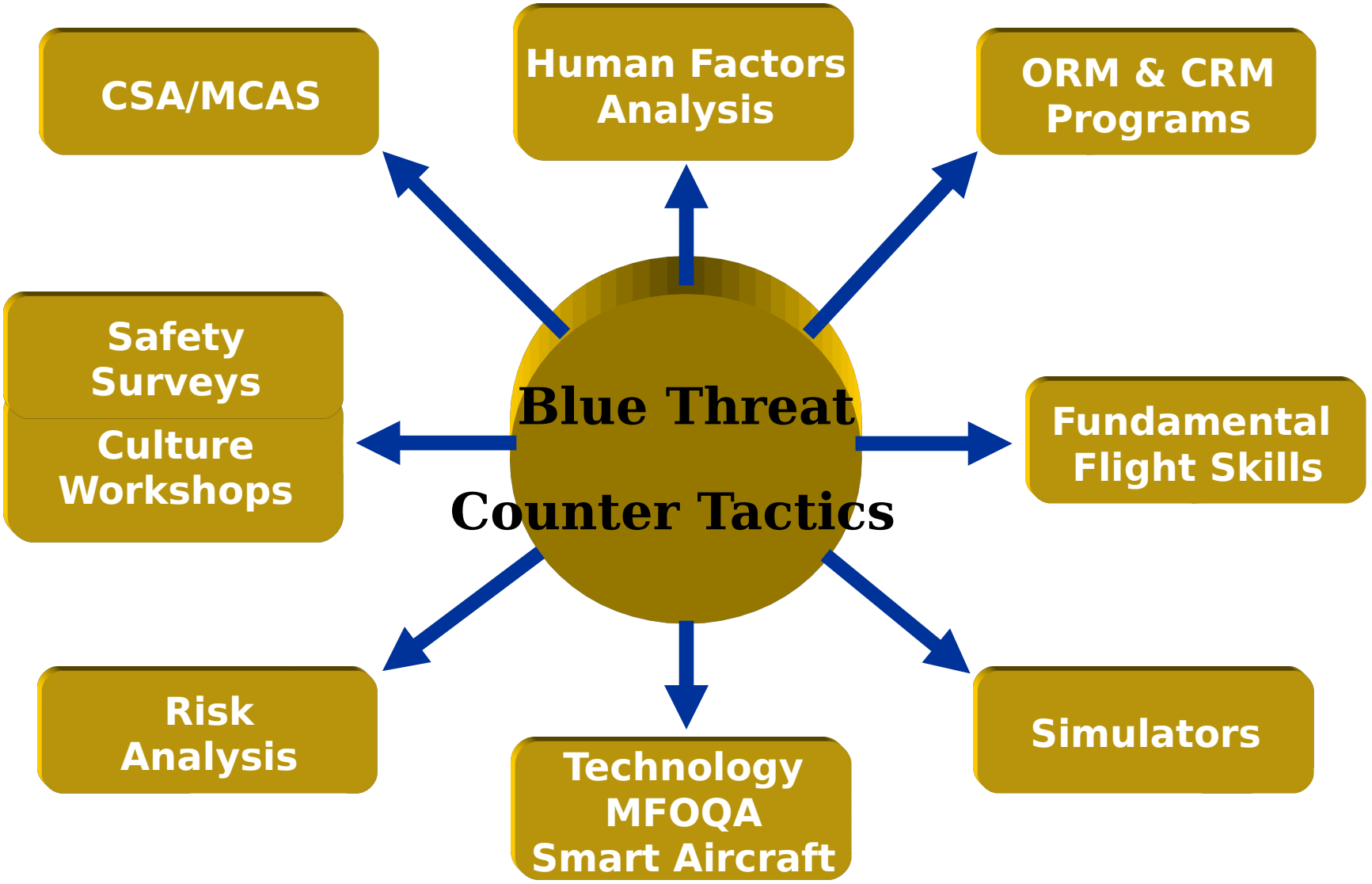
Ø Poor NAMP program knowledge/compliance among command personnel

Ø High OPTEMPO (real vs perceived pressure)

Ø Personnel manning numbers are rising but personnel are often assigned billets based on career timing rather than being the “right person for the job”

Ø Flight Surgeons spending more time in clinic and less time in squadrons.

Aviation Intervention Strategies



Current USN Aviation Safety Initiatives

- Aviation Operational Risk Management & Fundamentals Campaign – CNAF directed
- Command Safety Surveys – NAVSAFECEN
- Command Culture Workshops – NAVSAFECEN
- Command Safety Assessment /Maintenance Climate Assessment Survey – online surveys
- Aviation Safety Training at Commander's Course and Aviation Safety Officer school
- Crew Resource Management program update
- Naval Safety Training Continuum
- Web Enabled Safety System hazard reporting
- Operation Resource Management Assessment System pilot project
- MFOQA pilot project

Current USMC Aviation Safety Initiatives

- **Aviation Operational Risk Management & Fundamentals Campaign**
  - ORM Review Boards
  - Mishap Tracking/Endorsements
  - Program compliance through Monthly Aviation ORM Status Reports
- **CMC Policy Directive 1-05 on Marine Corps Aviation Operational/Safety**
  - Addresses abysmal FY04 record and establishes a refocus on Marine Aviation (SIR reports, training, Instructor standardization, SOP reviews….)
- **Command Climate Safety Surveys/ Culture Workshops**
- **Aviation Safety Training at the Commander's Course**
- **Aircrew Training Systems (ATS)**
  - Manages Training (Maintenance, Aircrew, and Command & Control) by facilitating Standardization, Evaluation and Crew Resource Management in order to provide a tactically relevant training continuum
- **Human Error-based training/education**
  - Enhances current CRM program
  - Currently taught at MAWTS-1 WTI courses
  - 4th MAW as the pathfinder to present the training in the squadron

The Business End of Rotary-wing Aviation

A MISHAP-FREE NAVY + MARINE CORPS Team

Is It Possible ?

Navy Mishap Free Squadrons
FY-05

VF-32 S
VFA-115
VFA-147
VFA-15
VFA-192 S
VFA-27 S E
VFA-37
VFC-12
VFC-13
VS-22 S
VS-33
TPS

VAQ-130 S
VAQ-141 E
VAQ-209
VAW-112
VAW-115 S
VAW-117 E
VAW-78
VT-6 S
VT-86 S
HC-2 E
HS-11
HS-5
HS-6 S

HS-75
HSC-25 S E
HSC-26
HSC-28 S
HSL-37 S E
HSL-40 S
HSL-43
HSL-45
HSL-48
HSL-51
VP-10 S
VP-47
VP-65

VPU-2 S
VQ-4
VR-46
VR-48
VR-51 S
VR-52
VR-54
VR-55
VR-56
VR-57
VR-58
VR-59 S
VR-62

** No reported Class A/B/C , FM/FRM/AGM/PMV/POD*

Safety Symposium

It's Your Safety Center!